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THE MACHINIST

ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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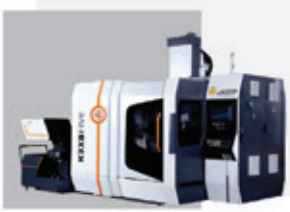

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NOBODY'S CHILD!

Beyond cement and steel, sweat and sinew are the lifeblood of any construction. For almost eight years, Amit Kumar, a 32-year-old construction worker from Odisha working on the outskirts of Mumbai, has spent his life as a refugee. Taking shelter under a plastic tarp and struggling for basic amenities, he and his family, which comprises two children who have often moved to different states, endure a horrid existence. Kumar is not alone; he is just one among a mammoth construction workforce building, connecting and uplifting the new India while remaining unaware of its rights.

The rights we are talking about are The Building and Other Construction Workers (BOCW) (Regulation of Employment and Conditions of Service) Act, 1996, and the Building and Other Construction Workers Welfare Board (BOCWWB). Although the Act was passed in 1996 and rules were framed in 1998, except for a few states, no states or union territories showed an interest in forming a BOCWWB until Supreme Court intervention in 2006 to constitute the welfare board and register and roll out the benefits.

At present, there are about 55 million construction workers in India, of which only 25 million workers are registered with the welfare boards across the country. The fate of the rest remains in the dark. This shows the indifferent attitude of the Central and state governments, compelling workers to live in deprivation. It is a fact that the construction industry has created lakhs of jobs, absorbing villagers in the hot, dusty building sites of the booming industry. But these unskilled workers - recruited by labour agents, dispatched to faraway places and clueless about their rights - live and work in squalor that the government has shown a little will, or ability, to improve.

That said, in this edition, we have an exclusive interview with Dinesh Patidar, Chairman and Managing Director of Shakti Pumps. He talks about the company's journey from making energy-efficient pumps and motors to foraying into the electric vehicle segment. Also covered in the edition is coverage of how consumers have started preferring sustainable products. What's more? This edition has also covered an interesting piece on how out of thin air, one can produce water. The story elaborates on how a modern-day scalable production model for 100 per cent renewable water can create a revolution in the beverage industry.

To sum up, this edition covers a range of topics from could infra, design engineering, and green manufacturing to automotive light-weighting and digital manufacturing. I hope you enjoy this reading this edition as much as we enjoyed putting it together. Do share with us your opinions, comments and thoughts at *Rahul.kamat@wwm.co.in*

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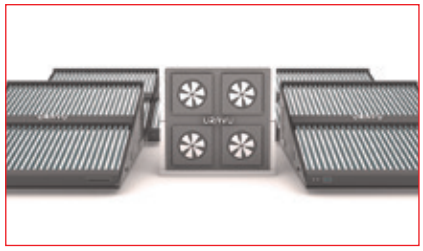

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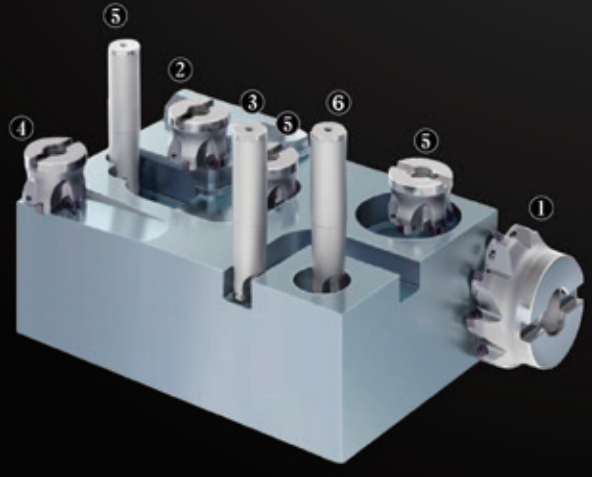

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YOUR GLOBAL CRAFTSMAN STUDIO

Grundfos Announces 2021 Results With Record Sales And Earnings

IN 2021, GRUNDFOS returned to strong sales growth of 10.4%, net turnover, thereby hitting a record 28.7bn DKK and highest ever earnings (EBIT) of 3.2bn DKK.

In 2021, Grundfos set a new sales record with a full-year net turnover of 28.7bn DKK. Grundfos' full-year return on sales (EBIT/Net turnover) reached 11.1% representing Earnings before Interest and Tax (EBIT) of DKK 3,185m. Adjusted for items not related to the company's operations, Grundfos' return on sales landed at 11.4%. The annual customer satisfaction survey showed world-class levels and was the highest score since Grundfos started conducting customer satisfaction surveys. The employee motivation and satisfaction survey continued to show strong results on par with the previous year.

Throughout the second half of 2021, Grundfos was increasingly challenged by supply chain constraints and sharp price increases on materials, energy and logistics services which added pressure on profitability.

"Our record results give us a strong foundation to face what will be a challenging 2022. The invasion of Ukraine is, first and foremost, a tragedy for the Ukrainian people. The global repercussions are immediate and far-reaching and have led us to pause all business activities in Russia. On top of this, the inflationary pressures and supply chain constraints are aggravated, making the outlook for 2022 very uncertain," says Group President & CEO of Grundfos, Poul Due Jensen.

Financial highlights full-year 2021:
Net turnover of DKK 28,733m
Sales growth in local currencies versus last year of 10.4%
Return on sales of 11.1%

Union Minister Nitin Gadkari Launches Green Hydrogen FCEV, Toyota Mirai

UNION MINISTER for Road Transport and Highways, Nitin Gadkari, launched the world's most advanced technology developed Green Hydrogen Fuel Cell Electric Vehicle (FCEV), Toyota Mirai, along with Union Minister Hardeep Puri, Union Minister RK Singh, Union Minister Mahendra Nath Pandey, MD of Toyota Kirloskar Motor, Masakazu Yoshimura VC TKM, Vikram Kirloskar and officials at New Delhi today.

Toyota Kirloskar Motor and International Center for Automotive Technology (ICAT) are conducting a Pilot Project to study and evaluate the world's most advanced FCEV, Toyota Mirai, which runs on hydrogen, on Indian roads and climatic conditions. This is a first of its kind project in India which aims to create a Green Hydrogen based ecosystem in the country by creating awareness about the unique utility of Green Hydrogen and FCEV technology.

It is an important initiative which will promote clean energy and environmental protection by reducing dependence on fossil fuels and thereby make India 'Energy Self-reliant' by 2047.

FCEV, powered by hydrogen is one of the best zero emission solutions. It is completely environment friendly with no tailpipe emissions other than water.

Green hydrogen can be generated from renewable energy and abundantly available biomass. Introduction and adoption of technology to tap into the green hydrogen's potential will play a key role in securing a clean and affordable energy future for India.

DMG Mori India Demonstrates Live Machining For Aerospace In Bengaluru

DMG MORI organised a technology evening at their Bengaluru campus, showcasing the latest machining innovations for the aerospace sector. Joining them, the global cutting tool manufacturer Kennametal demonstrated their latest cutting tools for the subject in the DMG Mori machines for the visiting customers.

"In the aerospace industry, precision is highly critical for performance and safety, and DMG MORI has been the most trusted technology partner for machine tools for over a decade across the globe. This technology evening provided our customers with a fitting platform to interact with DMG MORI's global and regional technology experts and keep themselves abreast with the latest and futuristic technology trends in machining," said Sunil Rao, Managing Director, DMG Mori India

The Technology Evening covered two hours of insightful presentation by Michael Kirbach, Head of Aerospace Excellence, DMG Mori GmbH, Jose Varghese, Director of Technology, DMG Mori India and Karthik Raman, Head-Product Management, Kennametal.

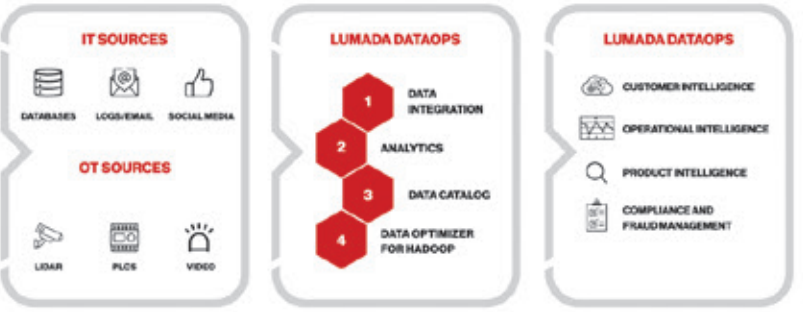
Post the presentation, the customers had a chance to witness live machining demonstrations of precision components on two of the DMG Mori's high-tech machines: CLX 450 TC – India's premier universal turning centre and CMX 600 VI – the Made in India vertical machining centre. The event was highly attended by customers from across Bengaluru who got the chance to interact live with global technology experts from Germany about DMG Mori's technology excellence and digitisation in the aerospace sector.

Hitachi Vantara Unlocks Data-Driven Innovation Through Edge-to-Cloud Data Fabric

HITACHI VANTARA introduced new Lumada DataOps capabilities for automated, AI-driven data operations for all enterprise customers. Additionally, Lumada Industrial DataOps provides advanced analytics capabilities for industrial use cases.

The Lumada DataOps portfolio allows organisations to create a seamless data fabric governed by an enhanced data catalogue for automated data quality improvements and governance. With the latest updates to data integration powered by Pentaho technology, customers can reduce time and complexity to discover, access, prepare and blend data across multiple data sources and locations. The new Lumada Industrial DataOps portfolio includes IoT analytics models for industrial environments that seamlessly merge IT and OT data to unlock transformational business insights.

Lumada DataOps lets you automate the daily tasks of collecting, integrating, governing and analysing data on an intelligent platform providing an open and composable foundation for all enterprise data while providing self-service data access to their choice of tools and analytics. Today's



updates to Lumada DataOps include:

- ***Data Catalog*** – Accelerate business insights with Data Catalog v7.0 using trusted data built on IO-Tahoe technology, including a powerful new user interface, data quality and Collibra connectivity.
- ***Data Integration*** – Integrate data across hybrid cloud with Pentaho v9.3 through flexible cloud deployment and new connectors for cloud data stores like Snowflake, MongoDB Atlas, Teradata, Elastic Search7.x and IBM MQ 9.2.

Hitachi Vantara's new Lumada Industrial DataOps portfolio enables real-time insights and outcomes that power critical operations to be more predictable and manageable. Lumada Industrial DataOps IIoT software automates data pipeline delivery across OT and IT sources, feeding industrial AI and ML models for predictive maintenance and operations optimisation. It accelerates IT and OT data convergence by building a data fabric for analytic solutions from the edge to multi-cloud. Capabilities of the new Lumada Industrial DataOps portfolio include:

Armed with clean, accurate data, organisations can leverage advanced operational analytics capabilities like Digital Twins and AI/ML models to predict and prescribe operational decision making.

LVD Acquires Solutions Business Of Kuka Benelux, Establishes LVD Robotic Solutions BV

LVD ROBOTIC SOLUTIONS BV will significantly advance LVD's expertise and market reach in robotics automation. The new entity will build on LVD's experience with engineering robotic systems for sheet metalworking, centred on no robot teaching, high throughput, and fast 'art to part'.

LVD will leverage the proficiency and capabilities of global automation leader KUKA to put robotised equipment within reach of manufacturers of all sizes and in a wide scope of industries beyond sheet metalworking. In addition, the new company will allow LVD to serve as a single-source provider of automation solutions for their customers' entire manufacturing business.

Core areas of focus for LVD Robotic Solutions will include standardised robotic solutions for sheet metalworking based on LVD products, such as Dyna-Cell and

Ulti-Form, using LVD's programming system CADMAN®-SIM, and robotic solutions for other industrial applications. These solutions could include part deburring, metal coating, automotive workpiece handling, press linking, windshield glue application, production line part bin picking, end of line packaging solutions, as well as a range of other industrial applications.

With the acquisition, KUKA BENELUX's engineering and project management staff become part of LVD Robotic Solutions. The robot sales and service portion of the KUKA BENELUX business is not part of the sale and will remain a separate entity located in the Houthalen-Helchteren office, focusing on expanding transactional sales and service of KUKA robots to integrators and end customers, including LVD Robotic solutions.

LVD acquires the KUKA BENELUX 7000-square meter Houthalen-Helchteren facility as part of the transaction.

Houthalen-Helchteren is situated in the province of Limburg, strategically positioned on the Netherlands - Germany border and centrally located to serve all of Europe, making it well-positioned for customer service and international business. LVD plans additional investment in the facility to enhance operations further and establish a Center of Excellence for robotics automation.

United Grinding To Participate In GrindingHub 2022, To Present C.O.R.E And More

THE UNITED GRINDING GROUP, one of the leading manufacturers of precision machines for grinding, eroding, lasering, measuring, and combination machining, presents its revolutionary innovation C.O.R.E. (Customer-Oriented REvolution) at GrindingHub 2022 in Stuttgart, Germany. Visitors can look forward to this and other innovations from the Group, to be presented to all guests at the Group's booth at an unveiling presentation on the first day of the trade show, May 17, 2022, at 10 a.m. local time.

With the initial presentation of C.O.R.E. at EMO 2021 in Milan, the United Grinding Group launched a revolution in machine tool development. The modern hardware and software architecture at the heart of C.O.R.E. offers a visionary new machine interaction concept and was recently honoured with the 'Special Mention' award for the outstanding user and customer experience at the UX Design Awards 2022. It also opens up new possibilities for networking, controlling and monitoring the production process, and thus for process optimisation. It also lays the foundations for the operation of modern IoT applications and the digital future.

The Group will also present new products from its various brands, including Mägerle, Blohm, Jung, Studer, Schaudt, Mikrosa, Walter, E.W.A.G., And I.R.P.D. The Walter Helitronic G 200 is the latest addition to the tool grinding machine range, featuring innovative machine concepts on a mounting area of less than 2.3 m2. Other brands, including Studer from the cylindrical grinding machines technology group, will also present world firsts. To keep things exciting, the company will not divulge any details about these new products before the unveiling presentation on the first day of the trade show.

United Grinding Group has selected the inaugural GrindingHub as the ideal stage for unveiling several of its innovations. The new trade show will also be the only German trade show the Group will be exhibiting this year. Stephan Nell, CEO, United Grinding Group, has high expectations for GrindingHub: "We welcome the merger of three strong and experienced partners in the world of trade shows: the VDW (Verein Deutscher Werkzeugmaschinenfabriken), Messe Stuttgart and Swissmem (Verband der Schweizer Maschinen-, Elektro- und Metallindustrie). Given the strong international orientation of the trade show, we are convinced that it has the potential to become the new leading trade show for grinding technology."

Volvo Group Expands R&D Operations In India, Becomes Largest Site Outside Sweden

VOLVO GROUP TRUCKS TECHNOLOGY in India employs more than 1600 engineers, and this number will significantly increase in the coming years. The current set-up includes many facilities, such as vehicle garages, electrical & electronics lab, AR/VR Lab and access to proving grounds.

The increased focus on product and project responsibility within Volvo Group's R&D operations in India has led to a demand for a framework that will enhance product knowledge and prototype validation capability within India. Today, this capability is being enhanced with the set-up of the Vehicle TechLab, a first in India's industry. This lab can house complete trucks, chassis and aggregates. It has various supporting equipment for engineers to test, innovate, validate and experiment with their ongoing work - through a set-up equipped with driving simulators, test benches, 3D scanners, among various other tools and systems.

"This Vehicle TechLab is designed as a collaborative virtual workspace – creating a simulated workshop environment – using technologies like virtual reality, human body motion tracking & realistic digital rendering of vehicles that allows Volvo Engineers across the globe to connect & collaborate virtually. This facility will significantly reduce the development times, improve problem-solving and offer better insights & speed in building innovative solutions," commented CR Vishwanath, Vice President, Volvo Group Trucks Technology, India.

Projects being worked upon cover a range of areas: General vehicle technology, electric, autonomous, and connectivity solutions. Engineers will have access to complete products which could well include battery-electric or fuel cell electric trucks too, among other options.

This Vehicle TechLab adds to the growing capabilities of Volvo Group's R&D operations in India. In July 2021, Volvo Group launched CampX – Volvo Group's Global Innovation Arena - in Bengaluru. CampX in India has already engaged with close to 70 start-ups and is now building multiple proofs of concept with several start-ups.

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By Anvita Pillai

"ENTERPRISES ARE COUNTING ON AI TO ENSURE BUSINESS CONTINUITY"

Enterprises today are encountering a fast-paced development and are using technology to meet market expectations. In this interview, **Anand Mahurkar, Founder & CEO, Findability Science,** elaborated on the role of technology in the manufacturing sector's evolution, the challenges encountered, where it places itself in the entire picture and more. Excerpts…

As the prominence of Industry 4.0 accelerates in the manufacturing sector, what role would AI play in the industry's journey to automation?

The proposition for Industry 4.0 is to combine embedded system production technologies and smart production processes, which will fundamentally change the industry, production value chains and business models. The business objectives of Industry 4.0 are to increase operational efficiency, reduce business risk and improve customer engagement. To achieve these objectives, AI is touted to be the most transformational driver, as it can exploit the huge amount of data generated via connected production resources. While global leaders acknowledge the capabilities of artificial intelligence in reshaping enterprises, how AI is viewed, considered, implemented and employed determines its impact on the business.

Enterprises are counting on AI to ensure business continuity, transform how businesses function and gain a competitive advantage. IDC estimates India's AI spending to reach $880.5 million in 2023 from $300.7 million in 2019, which showcases that more enterprises are looking to adopt AI for digital transformation.

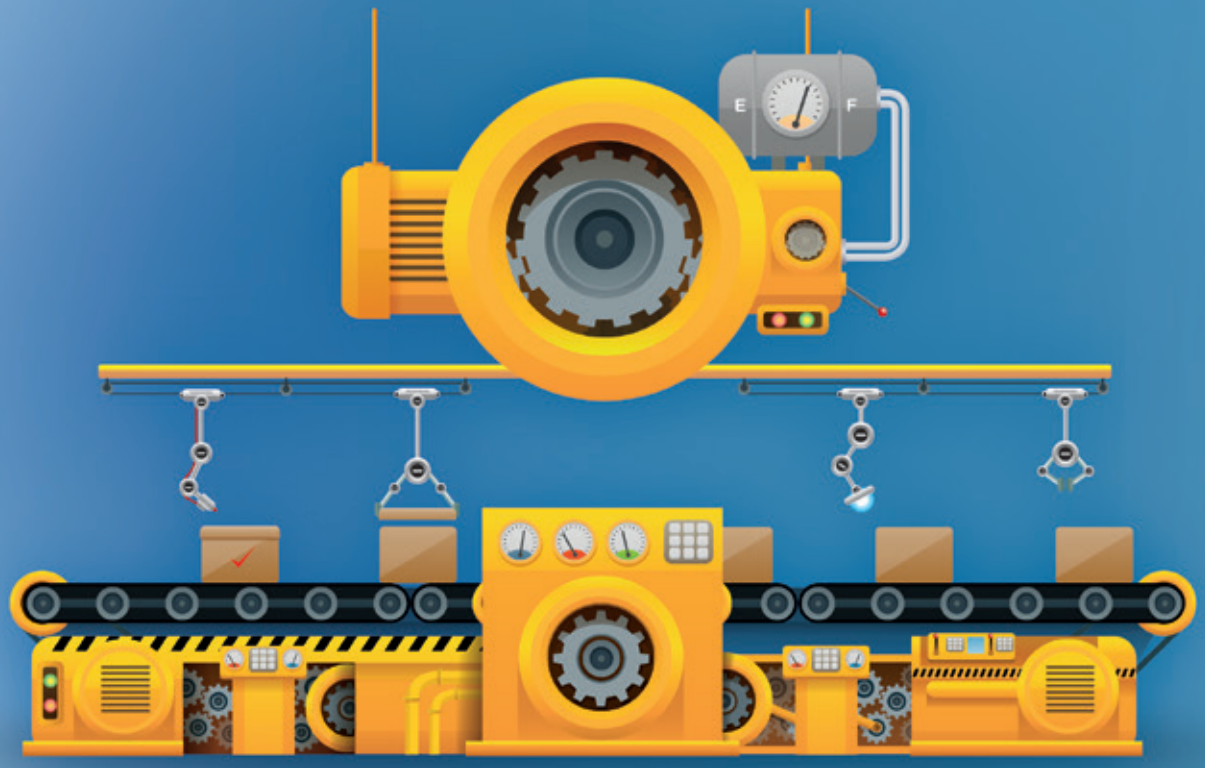
What are the major challenges companies encounter in deploying enterprise AI in the manufacturing sector? How can these challenges be counteracted?

Some of the significant challenges most enterprises encounter in terms of deploying enterprise AI, as Gartner suggests, are the lack of requisite skills, fear of the unknown and the lack of a data-first strategy. Lack of strategic view in AI adoption and only focusing on measurable ROI at the cost of ignoring strategic ROI and capability ROI is another challenge most enterprises face when deploying AI.

The key here is to build culture, skills and resources within the organisation and the right external AI partner that will enable enterprises to overcome such challenges by steering the organisation from data to AI. Manufacturing organisations can deploy AI across various functions, such as manufacturing operations, supply chain, sales and marketing, service and support, product development, human resources and so forth. AI's application in demand forecasting, predictive maintenance, predictive process quality, predicting lead time, the propensity of order cancellation, predicting employee absenteeism, predicting commodity prices, etc., will help improve resiliency.

"The key is to build culture, skills and resources within the organisation along with the right external AI partner that will enable enterprises to overcome challenges by steering the organisation from data to AI"

Your partner for industrial automation solutions



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A simple use case to understand AI in manufacturing is when data is collected from legacy machines by attaching IoT devices and then combined with external data like weather, one can forecast when a machine is likely to fail or what spare parts the enterprise should keep in inventory for just in time repairs.

How does AI essentially optimise one's demand and inventory forecast and eventually supply chains?

Gartner predicts that by 2024, 50 per cent of supply chain organisations will invest in applications that support artificial intelligence and advanced analytics capabilities. At Findability Sciences, our motto is to help traditional enterprises, like those operating in the manufacturing sector, realise that they can also become data superpowers. We understand their business complexities. Our technology is doing just that - AI-powered demand forecasting takes trend, seasonality, and cyclicity into account and helps estimate demand accurately. By incorporating data representing all the factors influencing demand, the accuracy can be enhanced. Demand for each SKU can be forecasted at multiple levels of each hierarchical level within the distribution network. The demand sensing through a series of short planning horizon AI-powered forecasts with predictive inbound supply chain indicators helps organisations to have end-to-end visibility across the entire value chain to achieve inventory optimisation and resiliency.

Where does Findability Science place itself in manufacturing's journey to become entirely digital? How are you helping organisations evolve from traditional to hi-tech manufacturing setup?

We, at Findability Sciences, aim to be true partners to and lead the digital journey of a manufacturing enterprise through all phases of its life cycle. We begin by simplifying AI for the leadership team to formulate an AI strategy for them. We evaluate data maturity, conduct data census, modernise the information architecture, and thereby identify, evaluate, prioritise and implement AI use cases through many of our products such as Findability.AI, Findability.DSL, Findability.LABS, and Findability.Inside. Our AI solutions provide an opportunity for manufacturing organisations to grow their business, align their business model to compete with the digitally born organisations, improve their operational efficiency and retain customers.

Our new offering is Findability.Inside helps traditional manufacturers or developers of hardware & software products power their legacy products with AI for enhanced revenues, customer satisfaction and reduce customer churn. It is a suite of easily embeddable, ready-made AI solutions that ensure agile and repeatable deployments. With Findability.Inside, traditional enterprise companies can easily integrate superior AI technology into their existing products and solutions without thinking of developing new technologies on their own and going to the market rapidly.

Can you elaborate on your revenues for the last year and your targets for this year? What is your game plan to reach the set targets?

We have a clear and targeted vision for 2022 – India is a very strategic market for us. We want to strengthen our proposition and provide cutting-edge AI solutions to organisations across industries. Our development centre is located in Aurangabad, Maharashtra, from where we service clients all over the world. Our revenue from India accounts for 30 per cent of our total turnover, and we expect a two-fold increase by the end of 2022. We are quickly expanding, and we intend to quadruple our workforce in India.

UPDATE

THERMAX BAGS RS 1,176 CRORE ORDER FOR SULPHUR RECOVERY BLOCK

Thermax Limited, a leading energy and environment solutions provider, has concluded an order of Rs. 1,176 crores from an Indian public sector refinery to set up their Sulphur Recovery Block on an LSTK basis.

The Sulphur Recovery Block includes 2 x 240 TPD Sulphur Recovery Unit (SRU) along with Tail Gas Treatment Unit (TGTU), 690 TPH Amine Regeneration Unit (ARU), 200 TPH Sour Water Stripper – phenolic and 95 TPH Sour Water Stripper non-phenolic.

The Sulphur Recovery Block will be a part of the customer's ongoing refinery expansion project. This landmark project is being pursued as a part of the Government of India's North East Hydrocarbon Vision 2030. The project will significantly contribute to the country's growth as well as the economic development of the entire North-Eastern region.

The scope of supply includes project management, engineering, procurement, manufacturing, construction and commissioning of the Sulphur Recovery Block. The project is slated to be completed in 28 months.

By Ashwini Kumar, Green Hydrogen Expert

GREEN MANUFACTURING: INDIA BY 2040

With the rising energy consumption, there is a need to focus on sustainable modes of electricity production and explore viable alternatives. The article elaborates on why green manufacturing is the need of time and how it can help grow the country.


Ashwini Kumar

Energy access and usage impacts the overall quality of life for any individual and forms the basis to measure the real human development in a country. Energy drives the growth of any nation, and India is stated to become the second-largest consumer of energy by 2040. Indians utilised 6,924 kWh per capita per year compared to Singapore (169,886), Canada (105,540), the United States (79,897), Australia (70,664), Russia (56,756), China (27,452), and a world average of 21,027 kWh per capita per year according to data estimates for 2016. Energy use not only includes electricity but other areas where consumption of energy takes place, including cooking, transport, industrial use, etc. India's per capita electricity consumption is also among the lowest globally at 1181 kWh per year in 2018 compared to a world average of 3260 kWh.

Energy use in India is growing dramatically, its villages are getting electrified, cooking gas has reached almost every household, and consumerism is making inroads into the lives of the financially weaker sections of society. Travel & tourism is increasing by leaps and bounds post COVID-19, and industrial output has risen steadily even during the pandemic. All this would make India's per capita energy consumption rise to beat the global average within the next ten years and increase further by 2040.

TIME TO GO GREEN

At the same time, India is already the world's third-largest emitter of CO_2, and increasing energy consumption would increase its emissions. The future, therefore, is green energy. Green electricity, energy from bio-waste, green hydrogen, to name a few. An increase in energy consumption will require tremendous support and innovation from India's manufacturing sector. India cannot afford to move in a direction where it will be compelled to import technology & machines to satisfy its energy demands.

Green Manufacturing is a term used to represent processes and solutions to manufacture machines, equipment, storage systems, distribution solutions for energy with zero or ultra-low carbon emissions, including solutions for ultra-efficiency systems. The green manufacturing sector is stated to become one of the most critical sectors of the Indian economy over the next few decades. India is currently a market where demand exceeds supply manifolds for equipment and components used for green energy production, distribution, storage, etc.

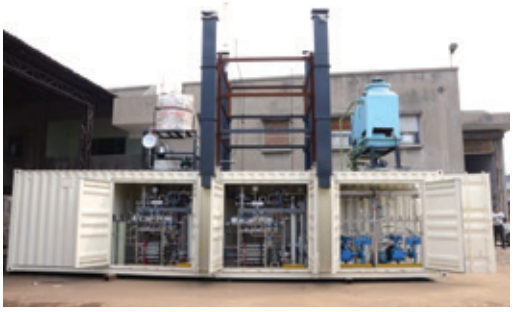
The solar energy sector is expected to become one of India's largest producers of clean electricity; however, the sector faces a severe supply crisis of solar hardware in India. Recently, a shortage of coal and power-rationing in China nearly stalled several PV projects in India, causing a rethink in India over its heavy reliance on Chinese imports.

The government policy to incentivise domestic manufacturing of PV hardware has given a big boost to the industry.

However, such policies have come in very late, considering the solar energy sector began booming in the country over a decade ago. Similarly, the wind energy sector is also steadily rising in India after a deep slump witnessed in 2015-16; however, the sector struggles to meet stringent local procurement requirements due to a lack of adequate manufacturing facilities.

EXPLORING ALTERNATES

India cannot simply rely upon green electricity produc-



tion, but it also needs to adequately utilise and recycle resources available within the country, like bio-waste. Waste to energy is another promising sector that, while contributing to the energy supply chains, will also address the large-scale CO2 emissions. Green manufacturing, therefore, would be required not only for electricity production through solar, wind, hydro projects, geothermal or ocean power but would be equally necessary for utilising biomass to satisfy our energy needs.

Green manufacturing is also essential to ensure adequate and proper distribution, storage and utilisation of clean energy. It is here that green hydrogen will play an important role in the future of India's energy mix. Hydrogen can be stored, transported and utilised like any other fossil fuel, albeit with some particular safety measures. The industrial and transport sectors of the country are potential large-scale consumers of green hydrogen. Green hydrogen is hydrogen produced using green energy, like using clean electricity or conversion of biomass. Green Hydrogen is also expected to play a dominating role in international energy trade over the coming years and decades. The Indian government has recently launched its National Hydrogen Energy Mission, and its policies chart out a course for industrial use of green hydrogen replacing existing fossil fuel usage.

India is also one of the largest importers of fossil fuels globally. Reducing fossil fuels is not simply replacing all fossil fuel machines with working on electricity, which is neither a practical nor a possible solution given the varied range of use of fossil fuels. Solutions range from developing ultra-high efficiency internal combustion engines (ICE) to replacing ICE with electric motors or green hydrogen-powered fuel cell electric motor systems, using alternative fuels like ethanol or methanol by modifying ICE or even using hydrogen as a direct fuel for ICE.

Green manufacturing will be essential to develop a complete framework for adopting electric mobility. It will be required to accomplish all methods of replacing fossil fuels. Components like lithium-ion batteries used extensively in electric vehicles are primarily imported and, therefore, the potential for its localised manufacturing is immense. Electrolysers, hydrogen storage and distribution components required for a functional green hydrogen economy are also currently imported by India. Methane capturing technology and solutions to capture methane from the coal mines are barely present in the country. Ethanol & methanol production is limited, whereas farmers continue to simply burn their crop residues for lack of an efficient alternative.

BRIDGING THE GAP

The problems of India's energy sector are truly immense, and, therefore, the potential for green manufacturing to address these issues are also tremendous. Over the past five years, several companies have emerged to cater exclusively to the green manufacturing sector and create low-carbon systems and products. Yet, the gap between demand and supply is continuing to increase.

Government support is present; however, it does not encourage small scale manufacturers to take up green manufacturing. For example, low-energy lighting devices were exorbitant and completely out of reach of the financially weaker sections of society. It was then that government incentives drove mass productions of LED lights bringing their prices down to a fraction of what they were sold only 10 years ago. LED light manufacturing was adopted successfully by small-scale as well as medium and large-scale enterprises. Likewise, suppose a government incentive to boost ethanol and methanol production, distribution and use in the country matches the schemes of LED lights. In that case, we may find alternative fuels to capture the Indian energy market replacing fossil fuels by over 50 per cent within this decade itself.

DEVELOPING GREEN MANUFACTURING

India is a vast country with varied geography, demographics, and different stages of development across its areas. To cater to the energy needs of the entire populace while keeping our environmental footprint at a minimum, our nation cannot simply rely on only a handful of solutions in energy consumption. As a nation, we will be consuming fossil fuels till at least 2100, so we could create highly efficient IC engines and focus on using alternative fuels either mixed with fossil fuels or independently. Furthermore, we need to address the financial costs of such conversions and replacements. Where replacing an ICE with an electric or hydrogen-powered motor would be prohibitively expensive, modifying an ICE to work on methanol would be considerably cheaper. Such solutions and 'jugaad' is key to achieving a higher per capita energy consumption while keeping our emission levels low.

Developing a green manufacturing sector is the only solution for a long-term sustained energy-conscious development across India. Localised manufacturing rather than import dependence would be critical in ensuring the country's overall development and growth and a better quality of life for its people.

By Anil Kumar, Director, Inovance Technology India

CLEANING UP MANUFACTURING – IT'S EASY IF YOU KNOW HOW

Not just businesses but consumers have started preferring products manufactured sustainably. The article delves into how automation solutions can lead toward sustainable manufacturing.


Anil Kumar

For us at Inovance, sustainable manufacturing means manufacturing in a way that doesn't harm people and the planet. The most obvious way to do this is by using less energy in the production process. Other methods include things like cutting material waste and improving safety procedures. It's clear that we've all got to play our part in the drive to sustainability. And, as individuals, we are all feeling more and more pressure to be 'green'. But we cannot do this alone. The fact is that manufacturing companies also need to play their part.

SUSTAINABLE MANUFACTURING – THE BUSINESS CASE

Luckily, there's a business case for sustainable manufacturing alongside the ethical case. After all, energy is expensive, and so are raw materials; if you could save money on these things, why wouldn't you? Not to mention the growing band of highly aware consumers who look out for sustainability not only in the products that they buy but also in the manufacturing processes of those products. Another consideration is government policies – these are getting more stringent all the time. If you can proactively cut your factory's energy use in advance of regulation, that's a good deal easier than doing it reactively when you are told to.

INDUSTRIAL AUTOMATION IS A KEY PART OF SUSTAINABILITY

The most obvious way to get sustainable is to save energy. And, when it comes to factories, there's one often-overlooked industrial automation component that does more than almost anything else to achieve this. I'm talking about variable speed AC drives.

Industry uses a huge portion of total global electricity. For example, in 2020, the US Energy Information Administration reported that the US industry used 33% of total US energy. And I'd be willing to bet that over half of that was used for electric power motors. The situation is pretty similar in most countries, including India.

SO, WHAT'S THE SOLUTION?

For many factories, adopting more variable speed drive technology is the easiest way to save energy and money. Let's take fans as an example. Even today, many factories just run fans with direct on line motors. This means the motor is running all the time at full

speed, even if the fan is only required for (say) 20 per cent of the time. It often happens because factories can't be sending someone round to switch fans on and off all the time.

These days, there's really no excuse for it. Simple applications, such as fans, pumps, and compressors, often represent the 'low hanging fruit' to save energy. But even highly sophisticated manufacturing machinery can easily improve efficiency with, for example, an advanced AC drive that uses the latest energy-saving common DC bus technology. A simple variable speed drive fitted to an application like this can easily slash energy usage by 60-80 per cent.

LOOKING BEYOND DRIVES

Looking beyond drives, there are many other ways that sophisticated automation solutions can slash wastage and improve production efficiency within factories. Intelligent PLCs can run the latest industrial IoT software to optimise one's machines and production lines, ensuring that all equipment on your shop floor is being used efficiently and that nothing is wasted. Alternatively, advanced CNC cutting solutions will not only reduce your material waste but also work far faster, again, a major energy saving.

I'm certainly not suggesting that industrial automation technology is the silver bullet to sustainable manufacturing. But it's a very important piece of the puzzle.

To continue the conversation about using automation solutions to implement sustainable manufacturing, contact: Anil.Kumar@Inovance.Ind.In

UPDATE

MANUFACTURING OF ULTRA-MODERN DEFENCE EQUIPMENT

The Government has taken several policy initiatives in the past few years and brought in reforms to encourage indigenous design, development and manufacture of defence equipment in the country.

These initiatives, inter-alia, include according priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP)-2020; announcement of 18 major defence platforms for industry led design & development; notification of two 'Positive Indigenisation Lists' of total 209 items of services and one 'Positive Indigenisation List' of total 2851 items of Defence Public Sector Undertakings (DPSUs), for which there would be an embargo on the import beyond the timelines indicated against them; simplification of Industrial licensing process with longer validity period; liberalisation of Foreign Direct Investment (FDI) policy allowing 74 per cent FDI under automatic route; simplification of make procedure; launch of Innovations for Defence Excellence (iDEX) scheme involving start-ups & micro, small and medium enterprises (MSMEs); implementation of public procurement (preference to Make in India) order 2017; launch of an indigenisation portal namely SRIJAN to facilitate indigenisation by Indian industry, including MSMEs; and reforms in offset policy with thrust on attracting investment and transfer of technology for defence manufacturing by assigning higher multipliers.

Capital procurement of defence equipment are undertaken from various domestic as well as foreign vendors, based on threat perception, operational challenges and technological changes and to keep the armed forces in a state of readiness. During the last three financial years (2018-19 to 2020-21) and current financial year 2021-22 (up to February 2022), out of total 197 capital acquisition contracts signed, 127 contracts have been signed with Indian vendors for capital procurement of defence equipment for Armed Forces.

Government has undertaken following policy initiatives for indigenous manufacturing of state-of-the-art defence products and transfer of defence technology from foreign countries to India:

- Specific provisions have been introduced in DAP-2020 under 'Buy and Make (Indian)' and 'Buy (Global – Manufacture in India)' category wherein indigenous production is carried out with Transfer of Technology (ToT) from foreign OEM.
- Discharge of offset obligations by foreign OEMs through ToT to Indian enterprises including government institutions has been incorporated and higher multiplier has been assigned to ToT under offset discharge.
- Government has notified the 'Strategic Partnership (SP)' Model which envisages establishment of long-term strategic partnerships with Indian entities through a transparent and competitive process, wherein they can tie up with global Original Equipment Manufacturers (OEMs) to seek technology transfers to set up domestic manufacturing infrastructure and supply chains.
- The Government of India has enhanced FDI in Defence Sector up to 74 per cent through the automatic route for companies seeking new defence industrial license and up to 100 per cent by government route wherever it is likely to result in access to modern technology or for other reasons to be recorded.

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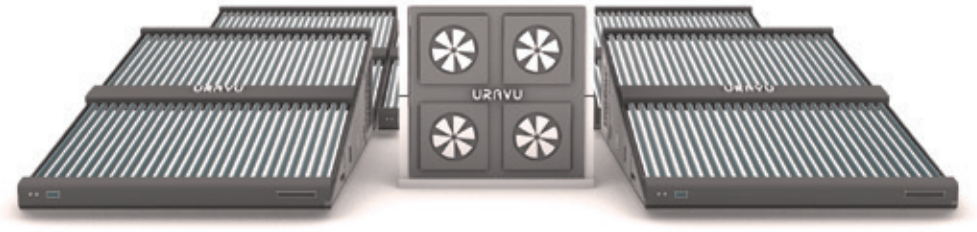
OUT OF THIN AIR: CREATING 100% RENEWABLE WATER

Beverage companies have been threatening groundwater levels of Indian cities for the longest time, creating a crisis for locals living in nearby areas. The article elaborates on how a modern-day scalable production model for 100 per cent renewable water can create a revolution in the beverage industry.



In a recent stinging order issued in late February 2022, the National Green Tribunal has found the Coca-Cola Company, which runs a 'happiness factory', a museum that celebrates the company and its iconic soft drink in Greater Noida also operates on the premises of an actual Coke bottling unit run by an Indian company called Moon Beverages. It illegally used groundwater for at least two years — from 2018 to 2020 – when the water table in the area was already critically low. Even after that, it continued to use the groundwater, which ultimately cost the company Rs 26 crores to compensate. Similar activities from companies like Nestle, Pepsi and many more have resulted in protests and demonstrations all over the globe.

The $2 trillion beverage industry has been highly unsustainable due to its heavy dependency on non-renewable sources like groundwater. It consumes more than 1500 billion litres of water per year, which not only contributes to the depletion of groundwater but also affects the life of the communities in those areas. Groundwater is cheap and loosely regulated, making it highly attractive to these beverage companies. The industry is growing, and so is its dependency on groundwater. Analysis of the water footprint of the top 20 beverage companies suggests that more than 45% of water is sourced from non-renewable groundwater by these companies.

The 'Coca-Cola stinging order' was among the hundreds of stories we read in the newspapers about groundwater exploitation affecting the locals and disturbing the environment. There's more to the story. In some states, the annual groundwater utilisation is higher than the net annual groundwater availability. It has exceeded 100% in states such as Delhi (120 per cent), Haryana (137 per cent), Rajasthan (140 per cent) and Punjab (166 per cent). Experts have noted that India is fast moving towards a groundwater crisis. Nearly 60 per cent of all districts in the country have issues related to either availability of groundwater, the quality of groundwater, or both.

It is time to reimagine the water infrastructure for the 21st century, as water is not limited to what we see on the surface. Water (vapour) is what we also breathe. The question is, "Can we use renewable energy to fulfil our water requirements from the air? Is there even enough water in the air to do this?"

THE BEGINNING OF A REVOLUTION

In the form of water vapour, air contains as much water as six times the water in all the world's rivers combined. In fact, it acts as a limitless natural water reservoir of freshwater as it replenishes in a cycle of every eight to ten days. Companies have been working in the water-from-air space for years and have witnessed water formation from thin air, but why do we need more?

The conventional technology, which has been around for more than two decades, is based on the same principle that underlies air-conditioning systems.

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"We want to focus on the beverages market which has [demanded] large amounts of high-quality water. The water that our system harvests have a TDS (concentration of dissolved salts) of 10 and a pH of 6.8-7, which is exactly within the requirements of beverage companies."

Pradeep Garg, Co-founder, Uravu Labs

Air-conditioners in our homes also use the same technology that artificially produces cold surfaces. In this process, the ambient air is passed over the cold surfaces, and a fraction of the humidity in the air is condensed out as freshwater. Companies like Watergen (Israel), Akvo (India), Maitri Aquatech (India), and around 190+ other companies worldwide are working in this space with air-conditioning technology. This saves the groundwater but takes in a lot of energy, in the order of 300-800 Wh/L, mainly derived from non-renewable sources of energy. This translates to 100-500 g of CO2/L of water produced by fossil-powered grid electricity. Switching to solar PVs can be a solution, but it would be very costly and inefficient. This demands a better solution.

That brings us to the next technology, a desiccant-based system, which could be a way to shift from the conventional air-conditioning technology to make water 100% renewable. Desiccants are water vapour loving materials and actively absorb moisture (this process is called absorption) when air is passed over them. And upon application of heat energy (at 60-80°C), release the absorbed moisture (this process is called desorption), which is then condensed to form freshwater. This is a relatively unexplored technology. Companies like Source Global, formerly known as Zero Mass Water, have attracted much attention in the desiccant-based water-from-air space. They have been rewarded with multi-million dollar funding from investors like Jeff Bezos, Bill Gates, Blackrock and others for their 5 LPD (Liters per day) panels.

The desiccant-based system has two sub-units: the desiccant unit and the thermal unit. The desiccant unit facilitates the absorption and desorption processes, and the thermal unit provides the heat energy needed for the desorption process. In the case of Source Global, these two sub-units are physically attached and integrated into a 5 LPD panel which weighs more than 200 kg and spans 2.8 square metres in area. The 5 LPD unit relies on direct sunlight, and only works during 6-8 hours of the day, remaining idle for the remaining hours. This creates a severe problem for making this system commercially viable and cost-efficient for potential consumers. The already large panel can't also be further scaled, rendering the solution non-scalable.

Meanwhile, Uravu's system has a decoupled design in which its two subunits, namely, the desiccant unit and the thermal unit, are physically detached from each other and interact with the help of a fluid media. Uravu's decoupled design makes the technology scalable and brings down the cost of water production as the sub-units can be scaled independently.

This system also undergoes multiple cycles of absorption and desorption throughout the day and night with the help of a thermal battery (thermal storage unit), effectively running 24x7. This increases the capacity utilisation factor of the system to 100 per cent (Source Global panels have a capacity utilisation factor of merely 20 per cent) and makes the technology further cost-efficient. The design also uses standard components and commercially available desiccant materials, making it easy to manufacture, scale, and maintain. Another noteworthy benefit of Uravu's innovative system is the added advantage of connecting its system to any heat source (above 65° C), including waste heat, solar heat, biomass heat, etc., making it truly energy-agnostic.

THE BLUEPRINT OF REVOLUTIONISING THE WATER INFRASTRUCTURE IN DIFFERENT INDUSTRIES

With an understanding of the over-exploitation of groundwater and the unsustainable ways of beverage production by giants, like Coca Cola and Pepsi, Uravu is primarily focusing on the beverage industry with its pilots, as stated by Pradeep Garg, one of the Co-founders in an interview with Inc42, "We want to focus on the beverages market which has [demanded] large amounts of high-quality water. The water that our system harvests have a TDS (concentration of dissolved salts) of 10 and a pH of 6.8-7, which is exactly within the requirements of beverage companies."

Sustainable development combined with such efficient technology will impact people's lives. A scalable 100 per cent renewable water solution could be an answer to the water problems the world is already facing. Renewable resources can help create the balance we need for the 21st century. The only question is, are we ready to be the change we want to see?

Courtesy: Uravu Labs

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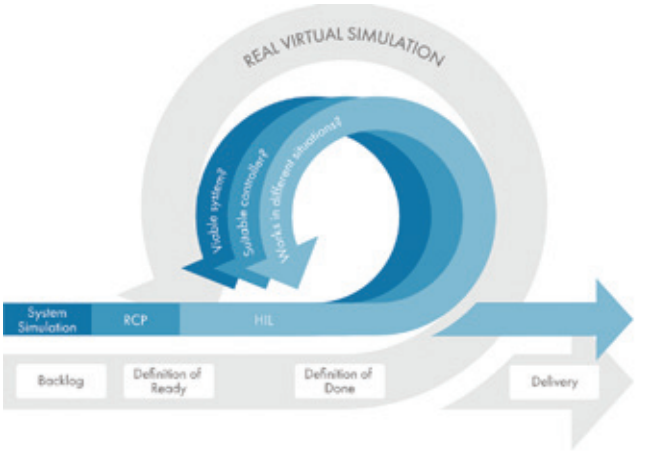
By Vijayalayan R, Manager – Auto Industry & Control Design Verticals Field, MathWorks India

MODEL-BASED DESIGN TO DEVELOP COMPLEX ENGINEERING SYSTEMS FASTER

Learn how model-based design can help engineering teams improve ROI and reduce the time invested in prototyping and development cycles

As requirements for increased product performance drive up design complexity, the software is increasingly becoming the differentiating factor in a product's success in the marketplace. Faced with the need to create more complex software with better quality in less time, engineers have turned to model-based design. Model-based design is used across various industries and applications, including motion control, signal processing, industrial equipment, aerospace and automotive applications.



WHY MODEL-BASED DESIGN?

Model-Based design can help shorten development cycles and reduce your development time by 50% or more by enabling the engineers to:

- Try new ideas and perform fast, repeatable tests with modelling and simulation
- Eliminate manual steps and reduce human error by automating key steps such as reporting, coding and verification
- Create a digital thread with traceability from requirements and system architecture to component design and tests
- Perform predictive maintenance, detect faults and optimise the system in operation using models as digital twins

WHAT IS MODEL-BASED DESIGN?

The model-based design provides a mathematical and visual approach to developing complex systems. It centres on the systematic use of models throughout the development process for requirements specification, system architecture modelling, design implementation, simulation, automatic code generation, verification and validation. It supports and encourages collaboration by providing a common language for cross-functional teams that work in multiple domains.

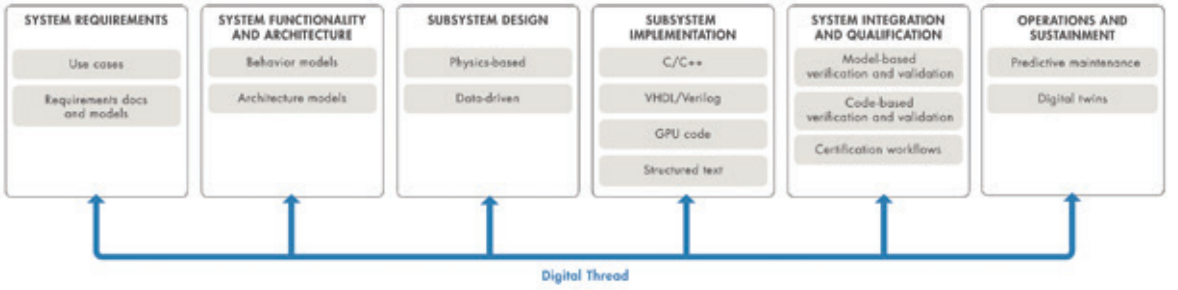
MODEL-BASED DESIGN COMPLEMENTS AND ENABLES AGILE DEVELOPMENT PRACTICES:

Like agile, the model-based design enables developers to discover defects and design problems in the early stages of a project, accommodate changes in requirements and deliver a system that meets customer needs. For example, users can perform fast iterations by connecting with continuous integration (CI) systems to automatically test and verify models and code throughout the development lifecycle.

MODEL-BASED DESIGN SUPPORTS DIGITAL TRANSFORMATION OF PRODUCTS AND SERVICES:

Users can extend the use of previously developed models to the operating systems, creating digital twins to optimise system operation, monitor system status and provide a feedback mechanism to the development team to make continuous improvements. This approach enables applications such as predictive maintenance and real-time fault detection.

HOW DO YOU GET STARTED WITH MODEL-



BASED DESIGN?

Teams cannot afford to be slowed down by changes in the way they develop systems. In practical terms, any new tools and process changes need to be introduced carefully. Trying new approaches and design tools carries an element of risk. Successful teams have mitigated this risk by introducing model-based design incrementally. They usually start with a single project, identifying early wins that can be achieved using model-based design versus using the current practice. Successful introduction of model-based design involves taking incremental steps that can help a project along without slowing it down:

- Experiment with a small piece of the project
- Build on initial modelling success
- Use models to solve specific design problems
- Stick with the basics
- Leverage the experience of experts

By adopting Model-Based Design incrementally, small engineering teams in organisations of all sizes have consistently achieved immediate and tangible results:

- Faster time to the first demonstration
- Faster time to market with a high-quality product
- Expanded capacity for developing complex systems
- With an incremental approach, these teams can smoothly adopt model-based design and perform at even higher levels of speed, competence and design quality

Adopting model-based design is a game-changer for systems development. For companies whose products cost thousands or millions of dollars, reducing the number of prototypes by just one unit is enough to prove the ROI. Companies with low-cost products that can have a high market share if they're first to market also see a large ROI. For them, the value driver of model-based design is accelerated development. Small teams that want to start adopting model-based design can do so by starting with a single project identifying early wins that can be achieved using model-based design versus using the current practice. Small engineering teams in organisations of all sizes have consistently achieved immediate and tangible results by adopting this path. Companies achieve dramatic, ongoing benefits in all scenarios by using model-based design for their system development.

UPDATE

TATA MOTORS TO INCREASE PRICES OF COMMERCIAL VEHICLES FROM APRIL

Tata Motors, India's largest commercial vehicle manufacturer, has announced an impending price hike of its commercial vehicle range. An increase in price in the range of 2-2.5 per cent, will come into effect from 1st April 2022 across the range, depending upon individual model and variant.

The increase in the prices of commodities such as steel, aluminium and other precious metals, in addition to higher costs of other raw materials, has incited this price hike of commercial vehicles. While the company has initiated actions to absorb a significant portion of the increased costs, at various levels of manufacturing, the steep rise in overall input costs makes it imperative to pass on some residual proportion via a minimised price hike.

By Deepak Mathur, Sr Vice President, Global Marketing & Sales, Jindal Aluminium Limited

ALUMINIUM, AN INGREDIENT FOR LIGHT-WEIGHTING

Light-weighting play is essential to make a vehicle safer and attain lower emissions. The article discusses how aluminium is the right material for automotive light-weighting

Deepak Mathur

Light-weighting plays a vital role in making vehicles safer and lowering emissions. Made possible by technology and new-age material, light-weighting presents an effective way to achieve energy consumption reduction and performance enhancement. Many sectors have well accepted and utilised this concept, especially in electric vehicles, aircraft or aerospace components and system design. Being lighter is better in many applications for various reasons. The less energy used in manufacturing means that products turn out to be more environmentally friendly. The lighter the product would mean it also requires less fuel for transportation, reducing costs for both manufacturers and consumers.

CHOICE OF MATERIAL

As environmental legislation is being worked out globally, any metal that makes light-weighting possible has become a crucial element in industries like automotive and aviation-aerospace. As country after country begin to commit themselves to reducing their carbon footprint and contain emission levels, manufacturers in these sectors have been looking at lighter yet stronger products. Research and development efforts to increase the efficiency of vehicles for improved safety, better performance standards, and higher resistance to natural damage like corrosion are ongoing. Aluminium fulfils this industry aspiration and presents itself as the metal of choice to the industry.

As the world gears up for a cleaner tomorrow, aluminium is recognised as a metal of the present and future. For the transport and mobility sector, both in road transport, where electric vehicles are emerging as the next big thing and in aviation and aerospace applications, light-weighting has become a critical requirement. In the automotive sector, the traditional way of reducing vehicle weight has been the method of downsizing. The past two decades have seen the weight of vehicles undergo a drastic change in terms of reduction.

Aluminium is now the second-most common material used by automakers world-over. Studies of the European Aluminium Association have shown that aluminium applications can help reduce vehicle weight by up to 40 per cent without compromising the vehicle's safety. It is also established that savings of 4.3 more kilometres per litre or approximately 10 per cent more in fuel economy can be achieved through light-weighting applications using aluminium. Overall, car components made of aluminium are anywhere between 10-40 per cent lighter than traditional materials.

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Event Calendar for 2022-23

Event Name	Month	Mode	Date
ET Metal Cutting and Forming Series 2022	Ongoing	Virtual	-
The Machinist Supershop Floor Awards 2022	June	Onground	17th June
ET Global Automotive Summit 2022	June	Onground	30th June
Plant Maintainence Summit and Best Promising Plants	July	Onground	27th July
ET Infrastructure Awards & Best Brands in Building Materials & Fittings 2022	August	Onground	26th August
ET Aerospace and Defence Summit 2022	September	Onground	29th September
ETGEBC Power Summit 2022	November	Onground	10th November
ET Global Conference on Plastics in Automotive	November	Onground	28th November
ET Best Brands in Metal Cutting and Forming 2022	December	Onground	15th December
ET Best Brands in Plastic and Polymers 2023	January	Onground	23rd January
ET Polymers Awards 2023	February	Onground	23rd February

In India, light-weighting is at a crucial stage to meet the challenges set by the government. As per the government's vision, it intends to ensure 100 per cent electrification of public transport and 40 per cent of personal mobility by 2030. As battery electric vehicles are being termed as the future of the passenger vehicle, questions of how much light-weighting will be necessary are being asked. Being heavy on weight is a demerit for the overall safety profile of an automobile, especially an electric vehicle. Light-weighting essentially drives the range and performance of an electric vehicle. In this context, aluminium alloys have helped vehicles increase range and load capacity, thus reducing range anxiety among buyers.

Another area where light-weighting capabilities are much sought after is aviation and aerospace. Aluminium alloys have reduced aircraft manufacturing costs with better fuel efficiency and handling. The future and development of new generation aluminium alloys lie in innovation, and it is innovation using aluminium that has resulted in safer and more reliable flights.

As manufacturers take on the challenge, update their designs, streamline production while factoring in maintenance and repair processes in aviation and aerospace, the results are being seen. Light-weighting for a Boeing 787, new-generation aircraft, ensured a 20 per cent weight savings resulting in a 10-12 per cent improvement in fuel efficiency. Besides a reduction of carbon footprint, improvement in-flight performance parameters like better acceleration, higher structural strength and stiffness, superior safety performance could also be achieved by lightweight design. It offers numerous advantages that are likely to continue to precipitate the increased lightweight metal and other material use.

BEYOND LIGHT-WEIGHTING

Being the engineering material of choice for various applications comes almost naturally. The principle of a lightweight design is to use less material with lower density while ensuring the same or enhanced technical performance. When aluminium is used, it goes beyond just light-weighting; it is a highly versatile metal with its advantages. Aluminium is also recognised for being flexible, offering a high strength-to-weight ratio, being resilient and ductile at low temperatures. Another crucial advantage of this metal is that a thin oxidised film forms on its surface when exposed to air, protecting it from corrosion.

Aluminium does not gather rust like steel, and even if scratched, this layer of the film quickly develops itself retaining the protection. This also makes it a favoured metal in the construction industry, in building fenestration, household utensils, or as packaging material, given that it is also non-toxic. In all of these aluminium uses, the product's weight plays an equally important role.

Looking ahead, light-weighting efforts using aluminium alloys will only continue to grow. The use of lightweight vehicles and new-age aircraft will continue to provide a practical solution for reduced fuel cost and reduced CO2 emissions. With commitments to reduce CO2 emissions only growing internationally, the use of a researched material like aluminium is set to prove further that it is the best ingredient for across industries in the times to come.

June 30, 2022

MOBILISING THE FUTURE OF INDIAN AUTOMOTIVE INDUSTRY

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"EVERY SETBACK IS A COMEBACK"

From making energy-efficient pumps and motors to foraying into the electric vehicle segment, Dinesh Patidar's Shakti Pumps is growing stronger and bolder. In an exclusive interview, **Dinesh Patidar, Chairman and Managing Director,** shares his vision, investment plans and more with **Rahul Kamat.**

"Mein ek garib parivar se aata hu and apne babuji ko ghar chalane me madad karne ke liye me sabjiya bechta tha" (I belonged to a low-income household and had to sell vegetables at the tender age of 13 to help my father to run the house), said Dinesh Patidar, Chairman & Managing Director, Shakti Pumps (India) Limited while beginning his hour-long interview with me talking about his company's 40-year journey passionately. Starting as a mere stainless steel pump manufacturer in India in 1982, Patidar invented the solar pumping solutions, which have changed the course of the company and the agriculture industry.

"My major areas of interest were designing and developing new products, experimenting with new ideas and working on complex engineering challenges," claimed Patidar. True to his nature, Patidar's Shakti Pumps recently ventured into manufacturing electronic controllers and motors for electric vehicles — two and three-wheelers. Now, he is preparing to offer similar products for the four-wheeler industry.

THE JOURNEY

The story of Shakti Pumps is nothing less than a roller-coaster ride. In 1982, Patidar, his father and "a partner", started the company. However, three years later, in 1985, the company suffered its first setback when Sr Patidar and his partner amicably parted away. "We initially struggled a bit, but when the business grew, we decided to list the company in 1995 publicly," an excited Patidar said. "We got the required capital, and from there on, our journey moved at a certain pace, expanding the business gradually, and the rest is the history."

60-65%

SHARE IN THE ORGANISED SOLAR PUMPS MARKET

During the 40-year journey, Shakti Pumps achieved various accolades and accreditations. The company manufactures nearly 5 lakh pumps per annum and can manufacture up to 10 lakh. It was the first company in India to be awarded the BEE 5-star rating for its energy-efficient pumps. "Today, we have over 270 pump models with the BEE 5-star ratings, and all our products are UL certified for product safety and reliability, which helps the company enhance market acceptability in the US, Canada and other developed countries," Patidar exclaimed.

Despite the accolades and accreditation, the company realised it was glaring at a grave problem

"We saw a consistent demand for our products, which resulted in growth in exports, and our profits also grew during the pandemic."

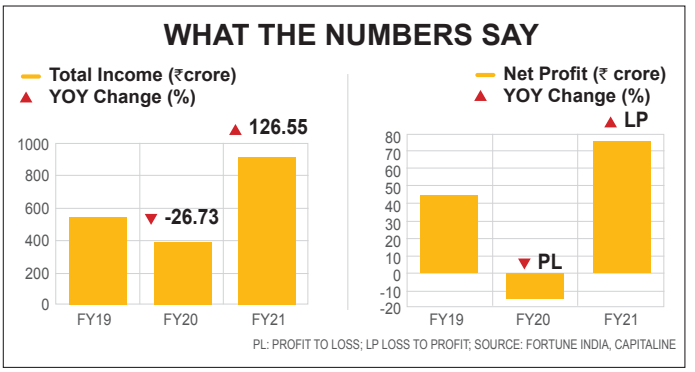
of brand visibility in the market. "We weren't much known in the market and somehow had to increase our visibility," Patidar said.

In 2013 when solar pumps were not used in the agriculture sector, the company had to engage actor Amitabh Bachchan as its brand ambassador to help market the products and communicate the USPs. What was the result? The engagement of the megastar of the century helped the company get much-needed national recognition. "However, we definitely couldn't afford him and the extravagant expenses on ad shoots, but somehow managed it for the greater good of our company," Patidar said on a lighter note.

As we speak, the rapid transformation is delivering growth. In 2020-21, the company's revenue from operations increased 143 per cent year-on-year to Rs 929.66 crore. Net profit rose to Rs 75.59 crore from a net loss of Rs 14.08 crore in the previous fiscal. Of the past year's revenue, Rs 560 crore came from the solar engineering, procurement and construction (EPC) business and Rs 180 crore from exports. The company had a market cap of Rs 1,000 crore in the second week of February.

DIVERSIFICATION PLANS

Patidar foresees a vast market for electric vehicles in



India, and therefore, capitalising on the demand, the company plans to foray into the EV segment with the manufacture of motors, chargers, controllers and multi-application component variable frequency drives (VFDs) for EVs using over 30 years of experience in making motors. "For this, we have approved the incorporation of a wholly-owned subsidiary – 'Shakti Green' which is registered under the GOI's PLI scheme," Patidar informed.

Since Shakti Pumps has more than 30 years of experience in manufacturing electric motors and five years of manufacturing power electronics equipment, the company, through its wholly-owned subsidiary, will manufacture and supply the battery chargers, EV controllers and EV motors that the electric vehicles market requires.

Patidar further added, "We are already in the testing phase of the two-wheelers' motor. By FY 22-23's first quarter itself, we will start developing, manufacturing, and testing four-wheeler motors and controllers. We also plan to manufacture DC chargers within the next six months."

SOLAR PUMPS - THE GAME CHANGER

As the company grew multifold with the various product line up, Patidar, being a farmer himself, thought of introducing solar pumps.

There has been growing momentum for the agriculture sector to shift to solar power. Many won't know, but the company is the first to launch solar pumps in southern markets like Andhra Pradesh, Telangana and Tamil Nadu. Meanwhile, what worked in favour of the company was BJP winning the 2014 general election. As renewable energy was the Hon'ble PM Narendra Modi's dream and vision, solar pumps were not my dream alone. It is the Hon'ble PM's dream too, and the benefits started accruing to us as well," revealed Patidar.

He further added, "Several state governments and the ongoing central government scheme (KUSUM Yojana) have primarily focused on increased awareness and nudged in favour of solar pumps. This increased awareness coupled with ease of procurement incentives has started to boost our domestic solar pump market and continue the demand for pumps for several quarters."

As far as PM-KUSUM is concerned, the company have approx. 40 per cent market share and 60-65 per cent market share in the organised sector, with a focus on Rajasthan, Haryana, Punjab, Madhya Pradesh, Maharashtra and Chhattisgarh. Under the PM-KUSUM Phase-II in FY22-23, out of the 3,10,000 pumps required to be installed, the company is targeting to install 75,000 pumps alone. Meanwhile, in Maharashtra and Haryana, the company claims to have installed about 60 per cent of the solar irrigation pump sets in use. It is now looking at the US, Canada and other developed countries as potential markets.

The company has recently launched a new range of advanced solar energy operated pumps. It has carved out a niche space for its brand across domestic and international markets. Shakti Pumps recently launched SIMHA 2.0 Universal Drive, a unique product that powers solar pump sets and supports a wide variety of motors. The company has also installed and commissioned India's 1st higher HP solar pumping station in Mizoram and was recently felicitated for

early completion of Solar Pumps installation across Punjab.

The company is also a channel partner for the Ministry of New & Renewable Energy. One solar pump unit costs an average of Rs 2.15 lakh and increases depending on the wattage and load capacity. Farmers recover the cost within a year, according to Patidar.

> "We now have over 270 pump models with the BEE 5-star ratings, and all our products are UL certification for product safety and reliability."

THE MIZORAM DIARY

The Sialhawk (Solar Pumping) Water Supply Scheme holds the distinction of being the largest and highest solar pumping station commissioned for the sole purpose of providing drinking water to the village. Under this marquee project, Shakti Pumps has installed eight solar pump sets of 75 HP, the highest amongst similar projects in Mizoram. Of the eight solar pump sets installed, four pump sets will be working, and four have been reserved to be on standby. The solar pumps project will lift water from the river to a tank (with a capacity of 3 lakhs litre) in four stages.

The total vertical height from the riverside to the hilltop water tank is approx. 900 meters, and the total length of pipeline used to lift the water is approx. 7,000 meters. The clean and green power-based Sialhawk Solar Pumping Station has resolved the issues relating to transporting fuel daily to keep the diesel pump running, and the dependency on electricity and other problems such as power cables and availability of transformers at this high altitude would have otherwise been required. The Sialhawk Solar Pumping Station will provide access to drinking water and supply to over 4,000 residents of Sialhawk village in Mizoram.

"We were asked to install solar pumps at an altitude of approx. 4,000 ft in Sialhawk village, Mizoram; thus, making it the North Eastern Region's first-ever High-Altitude Solar Project," said Patidar.

5 Lakh
PER ANNUM
PUMPS CURRENTLY MANUFACTURED BY THE COMPANY

EXPORT, EXPANSION AND PERCEPTION

According to Patidar, exports are much easier now than a decade ago. Selling the product in the domestic market was easy. Currently, Shakti Pumps is registered in 130 countries, and its brand is registered in 84 countries. The company majorly export to the USA, Middle East and Africa. "We have our own companies in the USA to provide after-sale services and mainly require agriculture and industrial pumps. We have an EPC company in Bangladesh working on a solar project," informed Patidar.

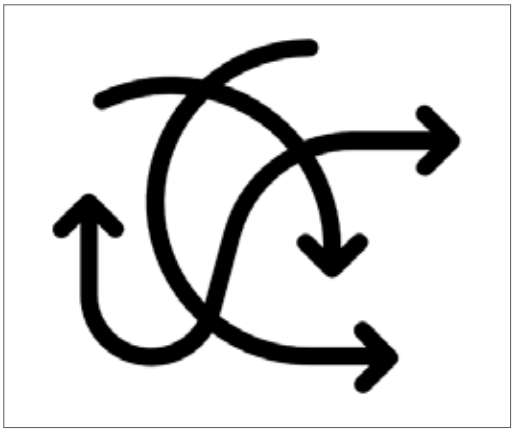
Over the years, the company has gradually increased its export market share. Sharing his experience, he said, "We have faced a lot of comparisons when dealing with international customers on our products but have always emerged victorious. We had to fight a lot with the perception that any Indian product would not pass a quality check or be of a low quality. I have faced that and have overcome and broken that perception in our international customers."

When asked about expansion plans, Patidar nodded positively but mentioned it would happen only when he saw growth in exports. "We weren't able to expand our export base in the last two years due to Covid-19, but we have been able to maintain our exports. Currently, our freight cost is less than 0.5 per cent. If we plan to set up another manufacturing unit, our expenses go up by approx. 3-4 per cent. So currently, it is not worth investing."

By Rajesh Gharpure, EVP & Global Head- Sustainability, L&T Infotech (LTI)

THE NEXT RENAISSANCE OF MANUFACTURING

The move towards digitisation has started in the manufacturing industry, but it requires a certain level of restructuring to adapt to the incoming development. However, this wave of 'great restructuring' is burdened with pitfalls. The article offers an alternative roadmap to digitise the manufacturing value chain of an organisation to make it a genuinely advanced cognitive enterprise.



The recent COVID-19 outbreak, a once-in-a-century pandemic, has resulted in significant economic and structural disruption across the manufacturing value chain. Businesses are gearing up with transformative strategies, termed the 'great restructuring,' to adapt to this changing environment.

There is a growing focus on end-to-end digitisation to reorganise supply chains from just-in-time inventory to resilient supply bases, developing a flexible hybrid workforce, and digitising operations to make them agile and responsive to fluctuations. These transformative initiatives are being accelerated by the adaptation of Industry 4.0 technologies by manufacturers and the industry.

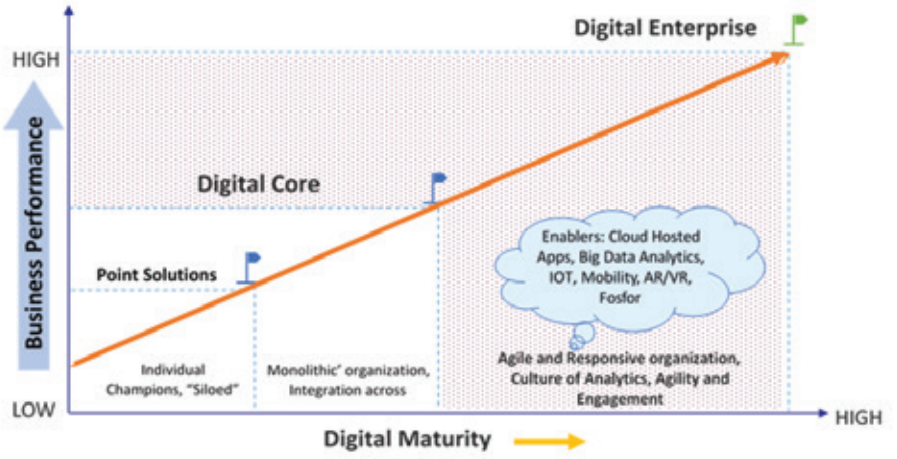
STUCK IN PILOT PURGATORY

A published statistic shows that 74 per cent of the customers who start their journey towards Industry 4.0 (I4.0) implementation are stuck in a pilot purgatory. The usual starting point for any implementation is a very focused point solution. However, after its POC/pilots, this point solution is tough to be scaled up as it addresses a small subset of the original problem. Clients then resort to implementing multiple point solutions to address the complete problem resulting in several joints in their data visibility layer of the organisation's technology architecture.

VOICE OF CUSTOMER

Clients are increasingly looking at implementing closed feedback loop digital interventions to accelerate their journey from siloed systems across points solutions to pivot their digital maturity towards a holistic digital enterprise ultimately.

Our conversations with clients have been across solutions related to the use of computer vision (CV) based quality automation and EHS applications, industrial data models that manage transactional and real-time data, both structured & unstructured, and end-to-end data visibility to prevent warranty frauds and accelerate recyclability and reverse supply chain.



Digital Maturity Framework with Industry X.0 Canvas (IXC)

INDUSTRY X.0 CANVAS FRAMEWORK - METHOD TO MADNESS AND STRUCTURED APPROACH TO MATURITY

Enterprise can elevate their digital maturity in a phased outcome-based approach by enabling the foundation layer of digital core and leveraging the power of the hybrid cloud and data-driven solutions overlayed with an ontology layer of conversation Knowledge AI.

IXC brings a strong ability to pivot industrial manufacturing to the next generation. Industry X.0 Canvas maturity framework provides a pragmatic approach towards scaling manufacturing maturity:

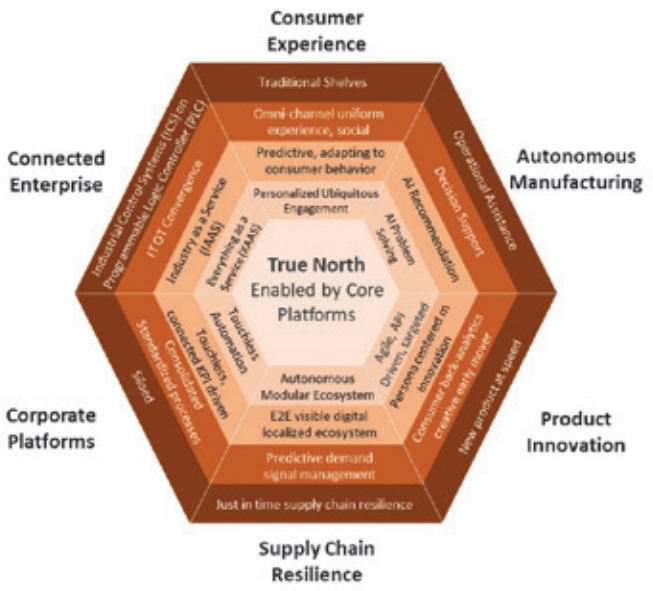
- **Phase 1: Visibility**
  Foundational applications provide visibility across the shop floor in planning, scheduling, production, materials, time management, quality and maintenance.
- **Phase 2: Integrated Visibility**
  Collaborative platform with integrated visibility of operations which provides technology-assisted interventions
- **Phase 3: Digital Twins**
  - Asset- Reimagined, insights-driven plant and asset models powered by AI to maximise availability, utilisation, and ROI
  - Worker- Digital worker collaborative platform enabling immersive experiences based on human/technology integration models
  - Process – Ready to deploy end-to-end process model using AI-enabled view of OEE, quality control, productivity, WIP, inventory cost, scrap, rework, logistics and warehousing.
- **Phase 4: Advanced Manufacturing Enterprise**
  Optimise manufacturing operations across the value chain by integrating information across factory and enterprise boundaries – to suppliers, dealers, and owners. Integration of PLM-ERP-MES-CRM – to create closed feedback mechanism across product design- development, execution and after-sales market to drive process efficiencies.

THE TRUE NORTH OF INDUSTRY 4.0

Trends in the industry are influencing manufacturers to leverage digital technologies beyond the gamut of the manufacturing walls to create unique customer experiences resilient supply chains, automate business operations with connected platforms and drive product innovation.

Let's look at one of these vectors in detail – Autonomous manufacturing. The journey towards smart and autonomous factory-of-the-future can be segregated into three distinct use case categories – Quick win, Next-Gen & Differentiated. A few quick-win use cases for smart and autonomous manufacturing are as follows:

- ***RFID based asset tracking & kitting process*** – Automate managing and locating process of physical assets. An RFID tag is loaded with data and attached to a relevant asset. This data can include anything from name, condition, amount and location. The efficiency and effectiveness of the manufacturing kitting process can be reinforced using RFID-based asset tracking.
- ***Real-time operations dashboard*** – These visualisations are automatically updated with the most current manufacturing and operational data available. When merged with historical data, this can be useful for identifying emerging trends, monitoring efficiency, and enabling quick decisions. A global pharmaceutical manufacturing organisation has been able to reduce its equipment downtime by almost 87%, leveraging a real-time operations dashboard.



The True North of Industry 4.0

- ***Prognostics*** – The process of monitoring the health of a machine or product and predicting its remaining useful life (RUL) by assessing the extent of deviation or degradation from its expected state of health in its expected usage conditions is known as prognostics. Prognostics is being implemented not just to products and machines but also to be extended to the overall manufacturing process, which would help predict quality issues before they ever occur. A global automobile manufacturer was able to reduce its mean time to repair (MTTR) by almost 70% through the implementation of prognostics on its shopfloor equipment.

Manufacturing organisations are targeting next-gen use cases in their journey towards smart factories. A few Next-Gen use cases for smart manufacturing are as follows:

- ***Digital Twins (DT)*** – A virtual representation of a machine or product that uses simulations, AI-ML coupled with real-time data from the usage of machine or product to provide a view of its current physical conditions and help predict any potential problems that the machine or product is going to encounter. Leveraging DT, a multinational aerospace and defence company, has been able to increase the efficiency of its aircraft engines, reducing carbon emissions of nearly 22,000 tons to date.
- ***Automated Guided Vehicles (AGV)*** – AGV is a robot system that can manoeuvre itself across a shop floor, not just horizontally but also vertically, without human intervention and support in material handling. AGVs are heavily used in warehousing, and their adoption on the shop floor increases. Not just manufacturing, a leading engineering & construction company is leveraging AGVs in the construction sites for surveys and advanced GIS solutions.

The differentiated use cases set the leading firms in the race towards smart & autonomous manufacturing. A couple of differentiated use cases are as follows:

- ***Additive Manufacturing*** – The revolutionary idea of industrial manufacturing by building one layer on another rather than the traditional manufacturing method of material removal has changed the way organisations look at manufacturing. With additive manufacturing, mass customisation will become a reality. A global luxury automobile manufacturer is developing and manufacturing close to 100,000 precision components every year by leveraging additive manufacturing.
- ***Augmented & Virtual Reality (AR/VR)*** – As the world begins to embrace the Metaverse, the manufacturing sector is trying to leverage AR and VR to accelerate product development, training operators in a secure environment, visualising manufacturing shop floor during the design phase, and some manufacturers are also using AR/VR to enhance their customer experience through interactive experiences with the products. Dealership technicians of a German luxury automobile manufacturer are leveraging AR/VR to pull in remote experts to help solve problems that could not be easily diagnosed. At the same time, we see a steep adoption of AR/VR technology.

CONCLUSION

Any business transformation initiative, such as the great restructuring, is fraught with pitfalls. Industry X.0 Canvas framework gives a roadmap for digitising the manufacturing value chain of an organisation to make it a genuinely advanced cognitive manufacturing enterprise. It provides a step-by-step pragmatic approach to improve the manufacturing value chain's maturity in terms of data visibility and data integration. The practice brings in leveraging the existing point solutions, data assets, and strategies to develop an end-to-end value chain management paradigm targeting critical KPIs of asset performance, production/operations, worker safety & productivity, and sustainability. It is an outcome-driven, personas-centric and business-focused approach to data democratisation and citizen development using hyper scalar platforms and data products to build the resilient manufacturing enterprise of tomorrow.

METAL CUTTING AND FORMING FOR THE TRILLION DOLLAR ECONOMY

A post-event report on the Economic Times Metal Cutting and Forming Summit hosted on March 31, 2022

The significant increase in demand for metal-cutting equipment from aerospace, defence, automotive, etc., hints at an exponential growth of the metal cutting and forming sector in the coming years. Additionally, with the pandemic in play, there is a shifting focus on boosting the prowess of the Indian metal cutting and forming industry. The global metal cutting industry will turn into a $101.48 billion sector by 2027, and India is eyeing a significant chunk of the market (according to Fortune Business Insight).

To explore the breadth and depth of the metal cutting and forming in the manufacturing industry, how India, with Make in India, can become a leader in this domain and more, the Economic Times hosted the Metal Cutting and Forming Series 2022, in association with MMC Hardmetal India, ExxonMobil Lubricants, Fibro India Precision Products and IMTMA.

The series kickstarted with an opening remark from Rahul Kamat, Editor – B2B division, Worldwide Media.

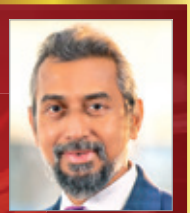
UNDERSTANDING THE CHANGING LANDSCAPE

Following the speech was a panel discussion on the 'Landscape and recent developments in the metal cutting & forming industry' moderated by Shatyabrata Das, Senior General Manager, IAC Group.

Das began the discussion by posing a question to Nikhil Verma, Vice President, Omega Bright Steel, on how Aatmanirbhar Bharat and Make in India are helping in the journey to grow the metal cutting and forming industry. Verma replied, "The auto components industry in India is currently growing four-fold because of the effect of covid and because of the mindset

> "The Indian industry is a lot more confident to invest in new technologies and create their IPs, because they are aware that the manufacturing sector in India is looking for greater value addition and not just simply assembly, giving the sector the direct benefits of the opportunity presented."
>
> **Kamal Bali,** President and Managing Director, Volvo India Group

> "Additive manufacturing is going to replace some of the metal cutting applications in the coming times, which the industry is already geared up to accept. It will not only reduce some of the additive manufacturing requirements, but it eventually helps the cutting tool industry as well to manufacture some critical component that the industry needs in its cutting tools."
>
> **Prashant Sardeshmukh,** Managing Director, MMC Hardmetal India



change of the industry, leading to a tactical shift from China to India. Another reason for this growth is the increase in exports due to the initiatives taken by our PM Narendra Modi." He emphasised that the initiatives have exposed India's potential globally, not just for high-quality products but also for extremely critical and technology-driven parts and products.

Elaborating on if the cutting tools industry is geared up to equip its cutting tools to match with high-speed variable machines, panellist Kamal Bali, President and Managing Director, Volvo India Group, mentioned, "There is always a glide path when it comes to imports from local manufacturing." He further added, "The Indian industry is a lot more confident to invest in new technologies and create their IPs, because they are aware that the manufacturing sector in India is looking for greater value addition and not just simply assembly, giving the sector the direct benefits of the opportunity presented."

Further, sharing his opinion on how additive manufacturing will change the future of the metal cutting and forming industry, panellist Prashant Sardeshmukh, Managing Director, MMC Hardmetal India, said, "Additive manufacturing is going to replace some of the metal cutting applications in the coming times, which the industry is already geared up to accept. It will not only reduce some of the additive manufacturing requirements, but it eventually helps the cutting tool industry as well to manufacture some critical component that the industry needs in its cutting tools, e.g., spares of welding cutters, complicated shapes of the cutter body/tool holders, etc."

THE EVOLVING TOOL MAKING

The event then proceeded to a fireside chat discussion between Vivek Nanivadekar, Executive Director, FIBRO India Precision Products and Kamat. The discussion ranged from the FIBRO's post-pandemic revival strategy to what the industry currently lacks and what future Nanivadekar envisions for the metal cutting and forming sector. Nanivadekar emphasised, "There certainly a growth in the Indian tool-making sector, but now we need to focus on reducing the lead time. Industries that tool-making companies are a part of, such as automotive, are evolving fast; so, we need to ensure that we are moving along with the industry." He continued, "Additionally, toolmakers should opt for more standardisation and concentrate on their core strength to deliver faster. Further, to enable this, there needs to be a focus on education and training. I believe we are capable, and we can become a global manufacturer."

BECOMING THE FOUNDATION OF THE INDIAN ECONOMY

Through its sessions and discussions, the Economic Times Metal Cutting and Forming Series 2022 made it clear that the machine tools & forming industry is the bedrock of the automotive industry. It is expecting massive growth and will help India's journey of becoming a trillion-dollar economy. With the convergence of new technology, favourable regulatory framework, and upcoming entrepreneurs, the next decade is for the manufacturing sector in India.

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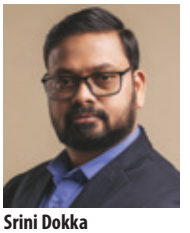
By Srini Dokka, Global Sales Head, MSB Docs

AUTOMOBILE INDUSTRY BENEFITS WITH SMART DOCUMENT TRANSFORMATION

The automotive industry is set to become a major contributor to the Indian economy in the coming years. The article elaborates on how digitising end-to-end is a need of the time.

According to the Automotive Mission Plan of India, the industry can be the engine of the 'Make in India' programme. In the next few years, the Indian Automotive sector could contribute to more than 12 per cent of India's GDP and, importantly, have 40 per cent of India's manufacturing sector share.



Srini Dokka

The sector is amid transformative change with the coming of the e-vehicle revolution. The pandemic, too, was a lesson in managing operations with minimal person to person physical contact. The other momentous change sweeping the industry is the acceleration of business timelines. From introducing new models with its uncountable number of subtasks to correspondingly reacting to competitive moves, all ask for squeezing of timelines. Customers' heightened expectations of support and responsiveness are the other dimension in this compression of time challenge.

The auto industry is leveraging multiple methodologies to meet the massive disruptions facing them. These include increased industrial automation, digital transformation and supply chain innovations, amongst others. One of the major enabling innovations being used to enhance the impact of the above methodologies is the deployment of enterprise-class smart documentation and eSignature transformation.

What makes smart documentation and eSignature transformation the magic ingredient is the impact on the management layer essential to every industrial activity. This management layer perpetually manages contractual processes, regulatory compliance, operational documentation, decision approvals, and document archival.

COLLABORATION AND TRANSFORMATION

Take the case of one of India's leading two-wheeler OEMs. The organisation is working hard to make the world smarter, safer and more mobile every day. The company realised that the traditional print-sign courier/scan-email cycle negatively impacted productivity, growth and customer experience. A scalable solution became a need of the hour to cut costs, improve efficiency and accelerate turnaround time. They opted for smart documentation & eSignature process that could be customised to fit into their existing workflow without changing the business model and customer definition.

Upon MSB collaboration, they digitally transformed how they sign dealership contracts and let their dealers generate invoices against the free service coupons (FSC) and warranty cards. In addition to satisfied customers, lower costs and higher growth, they saved a lot in customers' time to collect & sign documents, improved productivity and efficiency, and saved print, scan and storage costs.

Automotive organisations face similar bottlenecks in several aspects of their journey, from supplier and dealer contracts to regulatory compliance to every sub/micro contract management. When requiring physical sign-off, all these processes create a time penalty and, therefore, a market penalty.

Smart Document Transformation can make business life efficient with immense savings in time and costs. For example:

- Document sign-offs are no longer dependent on the person reaching their desk to process the physical papers
- For the automotive industry, the vehicle specifications and drawings need detailed study, review, and approval sign-off – smart document solutions significantly aid this
- ID Verification of customers, workers, suppliers with seamless identity and background verification prevents frauds by 85 per cent
- Pre-built document and workflow templates help in speeding up the process of creating digital purchase orders, thus shortening procurement cycles

- Easy retrieval of historic legally valid purchase orders helps nip many disputes in the bud, thus saving inordinate delays or litigation
- Document authenticity and legal defensibility is assured with each document transaction holding information about the IP address, the timestamp, and the signee's validated email address.

Additionally, an enterprise-grade smart document transformation solution will enable customisation that helps maximise the powers of its native features to not only fit the organisation workflow but also create additional efficiencies such as:

- Departmentalisation of collaboration groups that can improve work efficiency by as much as 95 per cent
- Enable signing of documents parallelly or in the sequence - or a mix of both, which unleashes tremendous flexibility and savings
- Allowing bulk composing of documents for multiple people for signing, which has been observed to create a 70 per cent reduction of manual steps.

PRIORITISING DIGITISATION

It is important to understand that electronically / digitally signed documents are permissible in the court of law as per the IT act of 2000. Aadhaar based e-sign is another innovation in the Indian digital signature ecosystem with immense benefits. As vehicle ownership increases amongst the masses, Aadhaar based signature authenticity becomes an important business tool.

In addition to the industry-wide advantages of Smart Document Solutions and eSignatures, there are specific business benefits with an enterprise-class implementation. These include a 90 per cent acceleration of internal processes and reduced completed document turnaround time. Agreement errors are also reduced by an average of 25 per cent.

Physical document workflow is likely to remain part of our businesses, and it is important that we leverage the digital layer to accelerate this process, much like in so many other aspects of business life. It is thus time that we prioritise smart document transformation in the automotive industry.

By Pankaj Abhyankar, Senior Vice President & Business Head, Godrej Tooling

GROWING NEED FOR FUTURISTIC TECHNOLOGY IN DIE AND MOULD MANUFACTURING

India's die and mould sector, one of the prominent contributors to the Indian economy, is set to grow with a CAGR of 9 per cent by 2025. The article explains why Industry 4.0 is necessary for the growing die and mould sector.

It is undisputed that the foundation and way forward for mass production depends upon the die and mould segment. The assembly of all physical products begins with a die and mould before being shipped by the company. In India, the die and mould industry has become one of the foremost contributors to the Indian economy due to its progression and technological advancements, with an expected CAGR of 9 per cent by 2025.

GROWING OPPORTUNITIES

Technology has evolved significantly since the invention of handmade tools. Globalisation and Industry 4.0 have emphasised innovation of die and moulds across industry segments. The automotive industry is a key consumer of die and moulds in the country. Apart from the auto industry, the electrical and electronics segments are also projected to drive demand. Some other emerging industries expected to create demand for die and moulds in India include consumer durables, medical, white goods and defence.

The die and moulds segment is driven by new opportunities for the light-weighting of products and safety-critical parts. Simulation technology enables output prediction and helps refine the design before manufacturing. Moreover, the development of 3D printing enables better thermal management of plastic moulds and die casting dies.

CONTRIBUTION TO THE EV REVOLUTION

Recently, the Government of India reiterated its focus on electric vehicles (EVs) as a part of the Union Budget 2022. It has introduced a battery swapping policy that will enable private players to set up battery swapping stations, encouraging further advancements for EVs. The primary components with business opportunities for tool rooms in electric vehicles will be for the motor casing, light-weighting and transmission parts along with their structural parts.

Additionally, with the policymakers making BS-VI compliance mandatory for automakers, many automobile components are being modified and replaced. Changes in the chemical composition of the fuel have necessitated the development of new engines, which, in turn, require new dies. The focus for EV developers would be on making the battery cases and allied components with lightweight aluminium, thus necessitating a distinct set of dice and sheet metal tools for higher strength. To be equipped for electric mobility and excel in design and consistency, manufacturers ensure seam-

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less execution, from simulation and design to assembly and production. Die manufacturers must ensure precision designs that match customer requirements to satisfy the growing competition. The assembled die should be thoroughly proven through actual shop-floor tests.

CHALLENGES

Due to the evolving designs in the auto industry, it becomes challenging to figure out the lead times for die and mould. The lead time is calculated with standard rope lengths with a certain wait time. They are rescheduled as and when the customer demands changes. In certain cases, the wait time buffers are used with tighter rope length plans to satisfy customer needs. In die casting, materials with higher thermal fatigue resistance are tougher than usual tool steels. Machining them in a cost-effective and timely manner poses a significant challenge. Sheet metal dies for high strength parts require cutting hardened steels at 55-60Hrc. It is challenging to cut these accurately and cost-effectively. A deviation in geometry leads to higher tool maker efforts in part proving. CAE analysis of high strength parts (DP >590 pascals) requires multiple iterations and may still demand multiple trials and correction cycles. HPDC castings with complex features and high-quality material filling properties demand innovative filling, venting, and cooling arrangement per CAE flow analysis. With the increased application of aluminium die-casting in load-bearing components for light-weighting, the demand for low or zero porosity is becoming a new norm. Standards are being rewritten with more stringent criterion.

TRENDS IN TECHNOLOGY

Using advanced 3D printing technology and additive manufacturing, die components with complex geometry and accurate machine efficiency to meet higher functional standards for EVs can be developed. These would have otherwise been difficult and expensive to create using conventional methods. 3D printing and additive manufacturing shift from design for manufacturability to design for performance. Digitally connected smart dies, which send out operational data to a cloud for facilitating repairs and replacement, are gaining traction.

Additive manufacturing is plummeting the expansion and development of the die and mould industry as manufacturers and consumers increasingly realise the importance of plastic and metal 3D printing. Additive manufacturing and 3D Printing increase cost-efficiency and reduce product development time while ensuring increased product customisation and minimal wastage. It helps in creating prototypes as well as manufacturing moulds directly. With the assistance of newer technologies like 3D printing, AI, MI, and additive manufacturing, all bases of the process, including simulation, production, design, and assembly of components for electric mobility, can be covered.

Die makers are increasingly investing in modern, high-end machines for metal cutting such as high-speed CNC Milling and large double-column CNC Milling with tilt heads, index tables, and EDM for erosion and wire cuts. Automated CAM toolpaths drive innovative cutting tool geometry that can help in reducing cycle time to achieve the desired finish levels quicker than traditional ball endmills. A blue light scanner, CMM with programmable controls, laser calibration, and ball bar equipment supported by CAD-CAM software for offline programming are preferable to ensure quality assurance.

The die and mould industry can further adapt to advanced technology by incorporating machines that can cut as per design intents in a minimum number of setups and faster than present timelines, viz., 5-axis machining centres already in vogue. IoT and digitisation for higher machine up times, real-time data available for faster and educated decisions on machinery, and part conditions are way forward for the industry. Integrating machines with the MIS systems and automation for repeatedly accurate executions will help scale up. A network supply chain for effective resource deployment will also prove beneficial.

IGUS TRAPEZOIDAL THREAD ACHIEVES 82 PER CENT EFFICIENCY

Trapezoidal threads have been mechanical engineering classics for decades. Motion plastics specialists rely on optimised interaction between the metal lead screw and the plastic lead screw nut geometries.

At igus, the nut's thread flanks are larger than those of classic trapezoidal threads, as is the width of the lead screw. This is a small change, but it has significant consequences: enlarging the thread flank results in more high-performance plastic used for power transmission. This means more tribologically optimised material, i.e., regarding friction and wear. "The asymmetry has enabled us to extend the service life so that it is about 30 per cent longer than that of symmetrical trapezoidal threads," said Thorben Hendricks, Head of the dry spin Lead Screw Drive Business Unit at igus. "Optimising the flank angle also increases the amount of energy supplied that can be used. We have flattened the flank angles of the lead screw nut and lead screw. This gives us above-average efficiency – up to 82 per cent at high pitches," he added.

The new dryspin thread technology is durable, efficient and quieter than many conventional trapezoidal threads. This is because the tooth flanks are not angular but rounded, reducing the contact area between the lead screw nut and lead screw. This leads to less vibration, which can take the form of rattling or squeaking.

The lead screw manufacturing tolerance is tighter than specified in DIN 103 7e, ensuring more precise operating behaviour, allowing for much higher speed in the application.

There are eight new installation sizes - harmonised lead screws and lead screw nuts, including dimensions with low pitches that enable quick one-to-one replacement of installed trapezoidal threads. The new lead screws are available with pitches of 6.35x6.35 RH, 8x40 RH, 10x3 LH, 12x25 LH, 14x4 RH, 16x5 RH, 18x4 RH and 20x10 RH. The lead screws are made of stainless steel or aluminium; the lead screw nut material can be selected from seven high-performance plastics and several geometries - from a cylindrical design with flange or spanner flats to a version with spring pre-load.

ISCAR EXPANDS MILL-4-FEED FAMILY

The remarkable progress made in rough milling over the past decades saw the introduction of fast feed milling (FF), also referred to as high feed milling (HFM). High feed milling enables much faster machining than conventional methods. Rather than using the traditional high metal removal technique – milling with considerable depths and widths of cut – users prefer the new approach to machines with a similar width of cuts. However, they use a much smaller depth of cut and apply at much faster speeds with substantially increased feed per tooth. Energy-saving shallow-cut 'fast' technology provides an excellent alternative to power-consuming deep-cut methods.

ISCAR's new FFQ4 SOMW insert features advanced capabilities for increased milling productivity in machining materials up to 60HRC, which takes fast feed milling a giant step further. It offers a flat chip former available for insert sizes 9, 12, 17, four indexable reinforced cutting edges, and an increased corner radius for improved performance in near-to-wall machining while maintaining the same tool diameter.

Produced from ISCAR's advanced SUMOTEC carbide grade for unsurpassed productivity, the advanced geometrical design combined with innovative carbide grades significantly improves resistance to edge breakage and chipping. It guarantees better tool life and enables highly productive fast feed milling, especially when cutting hard materials and machining non-continuous surfaces, resulting in interrupted cutting.

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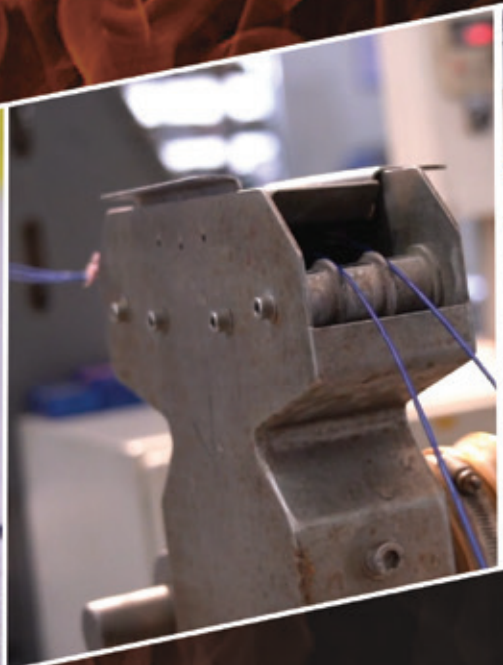

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